ABSTRACT

Hierarchical Level-Based IP Multicasting (HLIM) is a method for the multicasting of data packets from a source to a number of receivers on a network that supports both host and network mobility. In HLIM, IP routers are assigned to hierarchical levels to become hierarchical designated routers. The hierarchical levels also are used to define a scope region in which multicast data packets are to be delivered. Each scope region is associated with a unique root identifier (RID). Scope region information and root identifiers are placed into a multicast address so that multicast packers of data will be distributed to routers and hosts within the scope region. If a host (receiver or source) or sub-network moves out of the scope region but desires to continue receiving multi-cast packets the host can request receipt of such packets from its new parent hierarchical designated router through use of the RID and associated binding point (BPT). In this manner, HLIM provides a shared and shortest-path multicast tree without using a center point like a core or rendezvous point. HLIM supports not only host mobility (movements of IP hosts) but also network mobility (movements of IP routers with/without hosts). HLIM is oriented to operate in hierarchical networks, but can be also applied to flat networks by emulating the networks into organized hierarchical networks through mechanisms such as the Private Network-to-Network Interface ("PNNI") protocol used in ATM or multimedia support for mobile wireless networks ("MMWM"). Thus, HLIM can be implemented as long as the network nodes are connected in a hierarchy, physically or virtually.